

Historical evolution of forest management in Europe and in Japan

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1. Introduction

The current use of the English word “forestry” indicates the management of forest resources to provide a satisfactory mix and quantity of social values for clients living, while protecting these values and use options for future generations (KENNEDY, 1985, p.122). More specifically, in technical terms, “forest” is (FAO, 2001): “land with tree crown cover (or equivalent stocking level) of more than 10 percent and area of more than 0.5 hectares. The trees should be able to reach a minimum height of 5 m at maturity in situ”. The origin of the term “forest” (“Forst” in German and “forêt” in French) lies in the Middle-Age Latin word “forestis” or “foresta” which indicated land, not necessary woodland, mainly used for hunting and secondly for the gathering of mushrooms, bark and other non-wood products (HELLIWELL, 1987; FRITZBØGER & SØNDERGAARD, 1995).

The social perception of forest ecosystems has changed according to the interests and needs of human population with respect to the use of natural resources. Specifically it is possible to identify three historical periods:

Pre-industrial period (from the Middle-ages until the mid-17th century);

Industrial period (from the mid-17th until the mid-20th century);

Post-industrial period (from the late-20th century until today).

In each of these periods society elaborated new strategies and methods to find a rational management of forest resources.

The main purpose of this paper is to analyse the evolution of forest management over these three periods from the pre-industrial period until the emergence of the modern concepts of Sustainable Forest Management and Ecosystem Management. The secondary purpose is to describe the evolution of forest management in both Europe and Japan in accordance with the analysis above, emphasizing the European influence on Japan’s forest policy.

2. Historic forest management in Europe

2.1. Pre-industrial period

It is typical in the pre-industrial period the “multi-products” management had been in fact adopted even if the term “management” is not appropriate because in this historical period the

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forest are used without a management plan or a strategic planning. In this historical period we have characterized two phases: the first is more linked to silvo-pastoral economics, the second is complementary to and integrates with traditional agricultural economics.

Conception and Use of Forests in the Middle Ages

Forest is a reality that often emerges in life and in narrative and documentary sources all through the Middle Ages. Since the meaning of this word changes according to the period in question and the type of source, many scholars working on this subject have made interesting speculations on the concept of *forest*.

Let us start with an etymological remark: the Latin word *foresta* first appeared in Merovingian laws in the 7th century. The Romans used words such as *silva* and *saltus* instead. The origin of this new word has two possible explanations: it derives from the Latin adverb *foris*, indicating that the forest was all that remained “*en dehors des domaines*” (HIGOUNET, 1966, p. 375); or from the word *forum* (essentially tribunal, in medieval Latin), which show the dependence of forests from public treasury and courts (WICKHAM, 1990).

This latter opinion allows us to introduce another significant feature: the legal condition of forests in the Middle Ages. When they arrived in Western Europe in the 6th century, the Germans were the first to give legal worth to the forests as royal hunting reserves (*silva regalis*). They created a series of restrictions because Germanic psychology greatly esteemed hunting, with all the Germanic peoples regarding it as a symbol of social power and wealth and as an occupation reserved for kings and nobles (WICKHAM, 1990). Particularly after Charlemagne's age, during which hunting became a strictly ritualised activity (VILLANI, 1988), the word *foresta* comes to describe a wide woodland protected by specialized royal officers (HIGOUNET, 1966). During the Middle Ages, however, kings progressively lost their exclusive control over forests, and nobles, churches, monasteries, and, later on, local communities and communes started developing seigniorial rights over them (WICKHAM, 1990). Communal documents particularly point out an interesting change. While early medieval laws tended to preserve a social privilege rather than protect forests, later charters showed an increasing concern by public authorities about woodland deterioration and disappearance. Therefore, these later charters strove to protect forests by limiting and controlling their exploitation. Despite this new awareness of the risk of forests exhaustion, we cannot assume that the people of the 13th, 14th and 15th centuries shared any real ecological consciousness (ORTALLI, 1997).

How much woodland was there in western medieval Europe? Many studies have tried to answer to this question. Analyses of written sources, cartographical and geological studies, works on place names, soil, climate and pollen have all helped in this investigation (PANERO, 1988). The presence of an intensely warm period between the 13th and 16th centuries allowed a broad forest expansion, particularly in northern and central Europe and the Alpine region. On the other hand, in the Mediterranean area forests were thinner and their survival much more precarious because of the drier climate and intensive, prolonged clearances. Despite that, “*l'Europe occidentale du haut Moyen age était encore un monde de la forêt*” (HIGOUNET, 1966). After the 13th and 14th

centuries, however, wide and indiscriminate intensification of land clearances caused heavy damage to woodland resources all over Western Europe. That was the beginning of a lasting process that caused the definitive substitution of natural ecosystems with western agrisystems (DUBY, 1988; DELORT, 2005).

During the whole of the Middle Ages, forests were very much exploited, although with differing intensities. However, an important of the medieval economy was the balance between agricultural and silvopastoral activities. This both contributed to the survival of the rural peasantry and to the political control strategies of local authorities (WICKHAM, 1990; MONTANARI, 2003). Hunting, one of the more frequent activities performed in the forest, was reserved for the aristocracy. The rural peasantry on the other hand practised animal husbandry, especially pigs that were almost free to eat acorns and undergrowth foliage, and this represented the main source of animal proteins in the common diet (DUBY, 1988). Moreover, from pig skin people obtained the leather to produce clothing, harnesses and even bindings for monastic *scriptoria*. Pig pasture was so connected with the forest, that the extent of woodland was often indicated by the number of pigs it could support (DELORT, 2005).

Forests offered lots of useful, some would say indispensable, resources for medieval human communities: firstly fruits, such as raspberries, blueberries, strawberries and also acorns for pigs, beech mast for oil, chestnuts, which were central to the medieval popular diet, hops, wild fruit-trees that were rooted up and grafted, as well as honey, wax, resin used to make glue, and bark for tanning (BLOCH, 1973, p. 9 referring to 11th-13th centuries in France).

Forests were also exploited as a wood reserve, since wood was the “king of stuff” in the Middle Ages. It was used as firewood or to build different items, such as barrels, tools, hurdles for enclosures, fencing, boats and ships. Forests were also seen as potential arable land, after being cleared of trees and shrubs (DELORT, 2005). Across the centuries these unplanned and more-and-more intensive activities seriously endangered the survival of forests and forced local communities to elaborate specific laws to limit pasture rights, tree-cutting, and land clearance (NASO, 1988, referring to 13th-15th centuries in Piedmont).

If now we consider the perception of forest in medieval literary sources, we find an evident evolution in the role of woodland from early medieval texts to later ones. The early medieval works (*chansons de geste*, romances, hagiographies) very rarely contained forest descriptions, for forest was seen as a familiar reality and did not need to be explained to readers or listeners. Despite this apparent lack of presence, forest had different and essential parts in medieval psychology, both positive and negative. It could be a shelter for hermits, persecuted lovers or outlaws; it was the place where for better or worse, feelings could easily explode out of control (ambushes, treason, rescues) or where heroes were put to the test. And it was also a dangerous, dark and threatening place, where frightening people could hide, such as bandits, pagans, witches, runaways, social exclusions (LE GOFF, 1983). On the other hand, in the later written sources, as urbanisation increased all over Europe and the distance between nature and human society became wider, forests were carefully described as an unusual landscape. They were perceived only as horrible, gloomy places where men could easily lose themselves forever (GOLINELLI,

1988). Finally, the forest was also the habitat of the wolf, perceived as the greatest of all medieval people. Its obsessive presence, both in literary texts and legal documents, reflects a growing difficulty in the relationship between people and the forest and a disorientation of western society towards the natural environment (ORTALLI, 1997).

Anthropocentric management in the modern age

In the Modern age (the late 15th century and 16th, 17th centuries) the multi-products forest (silvopastoral economics) came to be replaced with the traditional agricultural forest. Medieval forest management, based on selective cutting and uneven-aged stands, (AGNOLETTI, 2006) was replaced by tillage and the intensification of clearcutting (THOMAS, 1983). In other words, the substantial difference is that in the traditional agricultural forest a large part of the forest was gradually integrated into agricultural households (VOS, 1996).

During the Modern age, particularly in the plain areas of Europe, it is assisted to a progressive increase of the agricultural economics to damage of the other uses of land. Specifically, in those years two main factors that were notable were the increasing elimination of uncultivated areas and the reduction of the extent of forests (deforestation)¹⁾ and swamps. These events, that were important in the development of agricultural economies, created some economic and environmental problems:

- Limitation of silvopastoral economics typical of the collective communities of the Middle ages (limitation in the rights of hunting and product collection);
- Increase of hydrogeological instability (the protection function of forest) in mountain areas and flooding in the plain zones (e.g.: flooding in Italy of the Tevere river in the years 1495 and 1530).

In conclusion the Modern age can be viewed as an anthropocentric era where man bends nature to his own wishes and consequently the management of forests has been decided on the basis on the human needs (THOMAS, 1983).

2.2. Industrial period

The end of Modern Age as we have defined it coincides with the advent of the Industrial Revolution. During this period new social needs and demands arose and, as consequence the management of natural resources changed radically.

The first phase of the industrial revolution started in Great Britain in 1750, and it spread out from the end of the 18th century to the beginning of the 20th (to be second industrial revolution). The industrial revolution modified deeply the economy of European society, introducing innovation and technological progress and, above all, a new ideology of hedonistic ethics. As Guillaume-Thomas Raynal points out in the “Histoire des Deux Indes” (1770), the search for happiness is extremely important in the hedonistic ethics.

The industrial revolution brought two immediate changes: the first one regarding the nature of the production and the second one concerned with labour, which transforms raw materials into products and services. Production increased considerably and the technological efficiency

improved significantly. These factors caused an increase in the demand not only of raw materials (wood, cotton, iron, coal) but also of roundwood for construction, fuelwood for domestic use, pole wood, charcoal and tannin.

In this context the work of Georg Ludwig Hartig (1764-1837) and Heinrich von Cotta (1763-1844) developed the concept of “modern” silviculture. The old mixed forests were replaced with monospecific forests managed with new techniques (fertilisation, selected exotic species, artificial regeneration), and harvested by clear cutting (VOS, 1996). In the Mediterranean regions coppice using short rotations of 3 to 10 years replaced the high forest (AGNOLETTI, 2002). The economic approach to forestry management was imperative, the need to achieve maximum forest revenue has concurred to the affirmation of timber market, industrial silviculture and different forestry branches (wood technology, forest economics, forest mensuration and assessment) (AGNOLETTI, 2006).

The increasing demand for wood products and the consequent increase in human pressure on the forest resources were the main causes of the elaboration of two following forest management doctrines (GLÜCK, 1987):

- Timber primacy doctrine;
- Sustained yield doctrine.

The timber primacy doctrine (TP) was born in the middle of 19th century and it has had the maximum importance in Europe during the first and the second World War. In the TP doctrine the prior objective of forest management is timber production in qualitative and quantitative terms. All other goods and services of the forest (for examples tourism and recreation, protection against natural hazards, carbon sequestration) have a secondary importance in relation to the primacy of timber production. This doctrine finds its ideological justification in the “wake theory” or “Kielwassertheorie” of forest management (GLÜCK, 1987, p.158; PREGERNIG & WEISS, 1998). In wake theory, proper management for wood production automatically provides beneficial multiple-use values (KOCH & KENNEDY, 1991). The wake theory promotes a multi-purpose forest management only when wood production is marginal (e.g. protective mountain forests).

The TP doctrine focused its attention upon timber production management; in this doctrine it is possible to find the origins of another theory, the Sustained Yield doctrine (SY). This doctrine gives special attention to the needs of the future generations and consequently to sustainable resource management.

The term sustainability in the forestry context was used for the first time in 1713 by Hans Carl von Carlowitz in his book “*Sylvicultura Oeconomica*”. In the 1804, Georg Ludwig Hartig asserted that sustainability was a priority in public forest management (VEHKAMÄKI, 2005): “Forest mensuration and forest management planning, or to determine exactly the present and future sustainable cut, or to establish a trustworthy cutting budget, is, indisputably, one of the most important responsibilities in any forest administration. ... Every wise forest administration has to draw up such sustainable forest management plans that allow as high a utilisation rate of forest as possible, bearing in mind that the administration looks after interests of future generations so that a fair distribution of interests between the present and future generations will

come true”.

In this cultural context, the sustained yield doctrine was born in Germany and it spread over Europe from the middle of the 18th century. In the literature there are many definitions of SY among them one is particularly significant. The Simpson Timber Company's definition states that: “Sustained yield means maintaining continuous production on all our lands that are economically and environmentally suited for timber production. Mature timber is harvested at rates consistent with both available supplies and market demands” (WALKER, 1990).

2.3. Post-industrial period

After the industrial revolution the social perception of the forest resource changed as a consequence of the shift from a rural society to an urban one. It was influenced by a series of key factors: improvement in the quality of life, growth and territorial concentration of population, increase of per capita income (MARINELLI, 1987), diffusion of the ecological ethic and increasing public interest in the social acceptability of forest management (WILLIAMS *et al.*, 2001). Urban society began to appreciate the romantic, non-utilitarian forest and the wildlife values in contrast to rural society where the practical, utilitarian values were still dominant (material and instrumental values) (KENNEDY, 1985). In this cultural context two main principles in forest management emerge: (i) multifunctionality and (ii) sustainability.

The concept of forest multifunctionality was born in Germany with the elaboration of the “Theory of Forestry Function” published in the “Forstwirtschaftspolitik” (1953) by professor Viktor Dieterich of the University of Munich. In this theory, the concept of multiple-use, widespread in North America (Canada and United States), was developed and widened through a less anthropocentric vision where the functions have an intrinsic importance (vitality and health of ecosystem).

The modern formulation of the concept of sustainability was elaborated in the report of the World Commission on Environment and Development (WCED), better known as the Brundtland Report (1987). In this report sustainability is defined as: “Meeting the needs of the present generation without compromising the ability of future generations to meet their needs”. This definition represents the conceptual basis of a new forest management paradigm that changed radically the traditional forest management: Sustainable Forest Management (SFM).

The first international definition of Sustainable Forest Management appeared in the early 1990s in a number of important documents: Agenda 21, the Rio de Janeiro Declaration on Environment and Development and the Statement of Principles for the Sustainable Management of Forests, which was adopted by many Governments at the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro (Brazil, 3-14 June 1992): “Forest resources and forest lands should be sustainably managed to meet the social, economic, ecological, cultural and spiritual human needs of present and future generations. These needs are for forest products and services, such as wood and wood products, water, food, fodder, medicine, fuel, shelter, employment, recreation, habitats for wildlife, landscape diversity, carbon sinks and reservoirs, and for other forest products”.

In this definition 3 fundamental aspects are underlined:

- First: an elevated consideration of social, economic and ecological aspects in the management of forest resources;
- Second: the attention to the needs of future generations (sustainability concept);
- Third: the enunciation of “traditional” (for example: wood products, food, fodder) and “new” products (for example: recreation, carbon sinks and reservoirs) useful for society and human activities.

In Europe the first definition of SFM was worked out during the second Ministerial Conference on the Protection of Forests in Europe (MCPFE) in Helsinki (1993): “sustainable management means the stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfill, now and in the future, relevant ecological, economic and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems” (Resolution H1 point D, MCPFE, 2000). This definition does not add anything new to the UNCED definition, but it stresses an important idea: “rate” or “social rate”, which is a key concept in environmental economics and in particular of renewable resource management science. During the third MCPFE in Lisbon 1998, the criteria and indicators of SFM were formulated to find means to measure the changes in forest management. A criterion describes the different aspects of sustainable forest management, while an indicator describes the development of a coherent set of tools to assess and assist further progress in sustainable forest management (Resolution L2 point B, MCPFE, 2000). After these considerations it is easy to understand that the definition of SFM and the techniques developed to quantify the changes (criteria and indicators) are important for the forest management certification process (eco-certification).

SFM presents two innovative aspects: first it aims to realise simultaneously social, environmental and economic functions and second it “places a greater emphasis on considering resources beyond timber and tradeoffs between timber and non-timber values” (LUCKERT & WILLIAMSON, 2005, p.360).

The final evolution of forest management doctrine is Ecosystem Management (EM). EM “integrates scientific knowledge of ecological relationships within a complex sociopolitical and values framework toward the general goal of protecting native ecosystem integrity over the long-term” (GRUMBINE, 1994). Robertson in 1991 formulated another definition of EM, where the spiritual, esthetic and recreational values of the forest are mentioned: “a multiple-use philosophy built around ecological principles, sustainability, and a strong land stewardship ethic, with a better recognition of the spiritual values and the natural beauty of the forests”.

This forest management philosophy was developed in the United States in the early 1990s, but the original formulation of its principles must be attributed to Aldo Leopold and his land ethic (1949). Aldo Leopold called the “ecosystem” simply “land” (CALLICOTT, 2000) and he focused his attention on these principles: (i) that the land is a system of interdependent parts, (ii) the man is a member of the system and not the master, (iii) the duty of management is to preserve the integrity, stability and beauty of the biotic community.

In Europe, the modern formulation of the EM doctrine shares many ideas with the *Dauerwaldgedanke* ideology (MÖLLER, 1922)²⁾. The Möller's theory considers the forest as a living organism and the single trees as cells. The best management has to maintain a good level of health and vitality of the forest ecosystem (WOLYNSKI, 1998). In order to achieve this objective managers must avoid traumatic actions against the forest ecosystem (for examples: clear cutting on wide surface, artificial regeneration with exotic species, etc.) and consider the ecosystem using an holistic approach.

3. Historical forest management in Japan - a comparison with that in Europe

3.1. Characteristic of Japan's natural condition for silviculture

Annual precipitation in Japan averages about 1,800 mm, with some regions averaging more than 3,000 mm. *Baiu* (front-induced) rains, typhoons, and snowfall account for most of the precipitation. Rivers in Japan are generally short and steep, even near their mouths. Japan's forests, which cover 67% of the total land area, have been regarded as buffers to heavy and seasonally concentrated precipitation.

Regarding geological history, it should be stressed that Japan's vegetation was hardly touched by glacier action and therefore biodiversity, especially in forests, is much richer than European countries in the Temperate Zone.

Because of the heavy rain in the hot summers, steep topography and rich vegetation including weeds, the cost of regeneration is very high in Japan (SHIMAMOTO, 1988). Although it is often said that Japan reserves its domestic growing stock as a matter of strategy, the fact is that, on account of weak economic competitiveness, Japan's forest owners cannot harvest their forests. Instead, they abandon and sell their forest lands at a low price.

3.2. Semantic consideration on concepts of the words *ki*, *hayashi*, *mori* and *yama*

Since around the 7th century, Japan imported *kanji*, ideograms invented in China. Basically each *kanji* has pronunciations; the original Chinese one(s) and that (or those) from traditional Japanese language the meaning of which corresponds to the imported character. Generally, individual *kanji* consists of several components each of them having its meaning(s) or pronunciation(s). The structure of a particular *kanji* is somewhat dialectical³⁾. Giving simple examples relevant to forestry, the shape of a *kanji* meaning a "tree" resembles that of single tree and has the dual pronunciations of *moku* or *boku* (near to the original Chinese one) and *ki* (traditional Japanese one). When one juxtaposes two *kis*, one obtains *hayashi*, usually translated as "wood" in the sense of an area of trees. Furthermore, combining three *kis* gives *mori* usually translated as "forest". Furthermore, since Japan is a mountainous country, *yama*, meaning "mountain" nearly (it also has the Chinese pronunciation of *san*⁴⁾) the shape of which resembles mountain, has often also meant forest.

As for *ki*, there is no academic controversy at all. It has always meant a single tree. Concerning *yama* (*san*), *hayashi* (*rin*) and *mori* (*shin*), however, there have been discussions about their

meanings. Above all, YAMAGATA compares the relationship of the German words *Forst* and *Wald* and Japanese words *hayashi* and *mori* (YAMAGATA, 1994). After a critical review of German articles on *Forst* and *Wald* as well as Japanese articles on *hayashi* and *mori*, he points out that it is incorrect to associate *hayashi* to *Forst* or *mori* to *Wald*, as Japan's preceding articles do. According to him, such attempts account for nothing because the ownership and use right which were an important feature to distinguish *Forst* from *Wald* did not exist in the sense of the Japanese words *hayashi* and *mori*. He proposed a new hypothesis that *mori* meant a physical landscape composed of dense trees, while *hayashi* meant that composed of both trees and not-cultivated range lands.

It should be stressed that, even if his hypothesis is correct in general, in Japan's history many conflicts among users of *yama*, *hayashi* or *mori* existed. For example, as YAMAGATA refers to, before or after the 17th century, *hayashi* was used in situations such as *o-hayashi* (King's forest), *mizu-no-me-bayashi* (legally protected watersource forest). In the same period *mori* was not used in this way, in the sense of ownership or restriction of utilization. In addition, it should be pointed out that the word *yama* (or *san*) has multiple meanings, to which YAMAGATA and preceding articles hardly refer. The original meaning of *yama* was mountain and it has various derivations afterwards; forests and range land, mountainous villages, landmark for navigation, watersource, agriculture, mining, hill fort for army (*yama-jiro*), places of hunting (*kari-yama*), nourishing and cutting timber, obtaining firewood and charcoal as well as mushrooms. *San-ron* has meant conflict among stakeholders claiming use rights. *Yama-bugyo* meant a forest court dealing with cases in feudal *shogun* (king)'s forests. *Aki-yama* meant feudal *shogun*'s forests in which people's use of firewood and charcoal was permitted, while in *Tome-yama* such utilization was strictly prohibited. Unlike *hayashi*, *yama* (and sometimes *mori* also) has been used as a word meaning sacred, spiritual, religious, solitary and/or secluded place, even in the case of non-mountainous locations. In this sense, *yama* meant also an asylum (a shelter or a refuge), which was similar in the words of forest, *Forst* or *forêt* to European countries such as the Sherwood forest of Robin Hood.

3.3. Pre-industrial period ⁵⁾

In the *Jomon* era⁶⁾, Japan's people depended on nuts (in evergreen broadleaved forests of the south-west area) or both nuts and salmon (in mixed forests including coniferous trees, deciduous broadleave trees and salmon-going-up rivers of north-east area). About 10,000 years earlier, shifting cultivation had already been introduced, which means that buckwheat was added to people's nourishment. Indeed, people's life was critically connected with forests and rivers, which made people from the ancient era aware of the multifunctionality of forest, especially the water conservation function. Also most lands, including forests, were accessible for everyone, or had "open access".

Introducing rice crop production heralded an important epoch. Gifted with the necessary rain in summer and the ability to give much higher productivity without impoverishing the soil, rice had rapidly spread through Monsoon Asia with vast investment in irrigation initialized by the supreme

power of Ancient States. It should be pointed out that such big power facilitated rice crop systems⁷⁾. Public investment in irrigation and water control (against floods and droughts) developed but was mainly concentrated in certain ages, when forest area decreased. Nevertheless, it was necessary for farmers to take *souhi* (weeds as fertiliser) from *sato-yama*⁸⁾ (forests and range located nearby rural villages).

This is similar to Europe where forests were used by local people for deriving living materials and by artisans for deriving raw materials for wood crafts, and so on.

In 718, the Ancient State enacted *yourou-ritsuryo*, declaring that any profit derived from *yama*, river, etc., should not be monopolized by any public power nor by any private person, which meant the authorization of “open access”. In early Middle-Age, high-level public officials could hunt, feudal lords could derive big trees and farmers could derive weeds and fuelwoods.

Communal *yama* had been formulated in the late Middle-Ages, with farmers occupying substantial areas (*Gesamteigentum*).

From the 16th century up to the first half of the 17th century, public investment in rice crops was large and, as a result, the area of agricultural land increased by up to 3 million ha, which required 8 or 9 million ha of *yama* for helping agriculture. Feudal Lords made such investment, frequently accompanying compelled labor of farmers, in competition with each others frequently neglecting the capacity of *yama*. But farmers’ pressure on *yama* on the one hand made severe conflicts referred to as *san-ron*, and on the other hand enhanced self-restriction of utilization of *yama* either within a village or among several villages.

3.4. Industrial period

Since Japan adopted a policy of seclusion in the early 17th century⁹⁾, it could not sufficiently import and apply European technologies until late 19th century. Japan, however, had developed its own knowledge base. This period may be said to be the age of preparation for industrialization. Developing of manufactures, in some cases the making of salt or mining, affected *yamas*, which caused poverty of local farmers. In some feudal regions, incited by such situations and inspired by traditional Japanese thought, *Ban-yama* (*banguri-yama*) was adopted in order to conserve timber resources in *yama*¹⁰⁾, which is similar to the German *Schlageinteilungsmethode*, although it was not written about in modern scientific terms.

It was the latter half of the 19th century when Japan began to introduce European modern technologies in all fields, not only natural sciences but also social sciences, legislation and institutions. In 1868, just before the era of Imperialism and after the Opium War in 1840, Japan’s government ceased its seclusion policy that had lasted three centuries and was eagerly willing to catch up with European countries, Russia and United States, or it was believed it would be invaded by them.

In the field of forestry, many students studied abroad, mostly to Germany (e.g. Tharandt, Eberswalde and Eisenach) while a few went to Nancy, France (MORIKAWA, 1986). They looked at many European forests as well as forest legislations. Conceptually, they watched afforestation of *spruce* in Germany and brought SY back to Japan. After returning, they regarded Japanese

cedar, cypress and larch as species corresponding to German *spruce*, which had already been planted artificially for centuries in certain advanced region in Japan and which were adopted by the new Government as adequate species to afforest denuded lands or regenerate coppices.

The first Forest Code of 1897, inspired by both French and other European forest legislation, and also based on the preceding domestic feudal restrictive regulations, established the legal and financial basis for such forestry, firstly in State Forests and then in communal or private forests. Not only did Japan send students abroad, but it invited several technological advisers from abroad. One example is the Dutch civil engineer DE RIJKE (1842-1913). In Japan he helped to create many plans of harbors, river conservation works, erosion control works, and so on. Concerning forest management, he condemned the removal of fuelwood by local people, which could be arbitrarily over-used at that time because Japan's government had here and there failed to modify its traditional common forest ownership to Roman-style private ownerships. His thought on forest management was strongly combined with erosion control and he wrote some proposals for some local governments on how to control watershed, citing French legislation and afforestation policy in 19th century (IGUCHI, 1985).

Der Dauerwaldgedanke by Möller stimulated Japanese foresters mainly in State Forest and it was translated into Japanese soon after its original publication. However, given the extremely moist climate, Möller's concept required weeding operations and the accompanying high cost in Japan. In other words, *Dauerwald* has been generally a labor intensive technology in Japan. It is true that the State Forest Office succeeded politically in enlarging its organization by advocating the attractiveness of *Dauerwald*, but the operational budget for intensive natural regeneration had not been provided continuously and finally caused unsuccessful woodlots (AKIYAMA, 1960). In addition, Japan had involved itself more and more in the imperial wars of WWI and WWII. Clearcutting with plantation of coniferous tree species became the standard silvicultural method in attempting to meet the increasing timber demand of the military, industrial and housing sectors. During the wars, especially in *sato-yama*, it was general that the cutting volume greatly exceeded the increment, regardless of forest ownership.

After WWII, Japan lost colonial lands including vast forest resources in Sakhalin and Taiwan, while again timber demand quickly increased for the restoration of destroyed cities and for economic growth. Although America's notion of natural resource management was introduced at the time recommended by the Occupation Government (General Headquarters/Supreme Commander for the Allied Powers: GHQ/SCAP), priority was given to economic development such as enhancing electric power in less developed watersheds resembling the Tennessee Valley Authority (TVA) model, where affluent "unused forest resources" such as old natural beech forests in hinterlands had been destined to be converted to young coniferous forests. In the 1960s, State Forest justified a harvest more than the annual increment on the basis of dynamic balance theory, meeting needs of national economy¹¹). Simultaneously, facing a shortage of timber, Japan imported much timber firstly from South-East Asia and later from North America, Soviet Russia and so on, which caused lower prices and the stagnation of the domestic forest economy. It was tragedy for Japanese forests because they had been artificially afforested and had additionally

required both tendering and thinning costing much more than any other country in the world considering its climatic and topological conditions. Some forest owners began to leave their forest as they were, without necessary silvicultural operations. Finally, until now, the situation has become unsustainable in both the economic and ecological sense. This point will be argued again.

3.5. Post-industrial period

It was in the 1970s that the environmental protection and conservation movements prevailed as income level grew and people became aware of the significant public nuisances of water pollution and natural environment scarcity. In 1971, the Forestry Agency announced a result of a study on the economic estimation of the external effects of Japan's forests and arrived at a figure of 1,300 billion yen (3,600 million dollars in current figures). Such attempts showed that the Forestry Agency had become aware of the environmental effects more than ever before and that it aimed to target more financial aid from the Treasury for both State Forests and non-State forests¹²). Such a strategy has been taking the following shape: in the mid-1980s a political movement of "watersource tax" took place in national level (but denied by government), in 1989 in State Forests "Forest Ecosystem Protection Zones" were designated, in 1991 a "Watershed Management System" was introduced by the partial amendment of the Forest Code, another amendment of Forest Code in 2001 introduced the zoning system having no financial basis¹³) but covering all the forests. In the 21st century of globalization combined with localization ("glocal") age, many local governments set up a "forest environment tax" (this time generally accepted by local people) in order to encourage the local forestry sector, indirectly aiming at global warming mitigation.

The idea of Ecosystem Management has been known to Japanese foresters (KAKIZAWA, 1999), but politically, such management would cost more and there was little possibility of compensation by society. Before the notion of EM becomes popular, that of SFM has prevailed to both foresters and the public by Rio summit, Montreal Process, Kyoto Protocol and forest certification in Japan.

4. Syntheses and Conclusions

In Europe the evolution of forest management approaches from the pre-industrial period to today can be represented by Fig.1. Synthesizing the forest management evolutionary process in this sequential scheme, we can say that during the "Middle ages" (before 1492 A.D.) European society managed the forest for its own subsistence within the scope of a silvopastoral economy

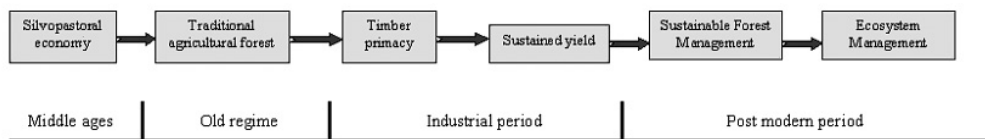


Fig. 1. Historical evolution in Europe of forest management approaches

and that in the “Old regime” (from 1492 A.D. to around 1750 A.D.) the increase in European population and agricultural development caused decreased forest land. During the “Industrial period” (from 1750 A.D. to the First World War) the demand for continuous timber production developed the timber primacy and sustained yield approaches following it. Finally, in the “Post industrial period” new social needs have activated the current forest management approaches: sustainable forest management and ecosystem management.

In Japan the evolution of land use is described by YORIMITSU (1984) as shown in Fig.2, although it is not directly compatible to Fig.1. Compared to Fig.1, the historical characteristics of Japan are a lack of silvopastoral economy (which may be substituted for “open access”) and vague delimitations of SFM and EM. In the current situation, no matter how precisely this delimitation is argued, sustainability of Japan’s forests depends above all on economics because most types of forest treatments for various purposes have high costs.

Considering that current forest values are expressed by three systems (economic, social and environmental) it is interesting to represent historical forest management approaches in such a scale of values. A bibliographical analysis has allowed estimation of the importance of each value in the different forest management approaches. Assuming that three represents the maximum value and one the minimum (not-considered value), Fig.3 describes the distribution of values for each forest management approach. The social value (integrating spiritual, cultural and the traditional values) was at the maximum level in the pre-industrial society when the forest supplied both timber and non-timber products to the peasant’s subsistence as much as in the modern society when people contemplate forest landscape and enjoy recreational activities. The economic value (forest products traded in the market) can be considered to have been more important in the industrial society (corresponding to the schemes of timber primacy and sustained yield) because of the great demand for fuelwood, charcoal and timber. Environmental value (biodiversity,

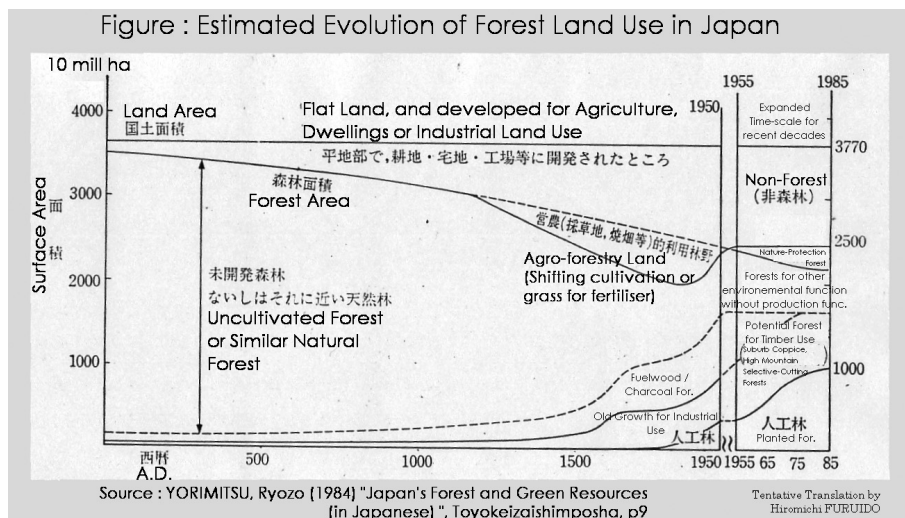


Fig. 2. Estimated Evolution of Forest Land Use in Japan

ecosystem health and vitality) is assumed to play an important role in sustainable forest management and the most important role in the modern ecosystem management philosophy.

5. Future work: political implications

Fig.3 shows that, compared with SY, SFM reduces economic value to some extent and EM reduces it more radically. In other words, the conceptual enlargement of “sustainability” (*Nachhaltigkeit*) has been needed by society since the 1970s and afterwards, sacrificing the economic value of forest stands in the narrow sense. It is true that the reduction of economic value is a loss for forest owners, at least in the short run, and a simultaneous gain for society, compared with the *status quo*, sustainability in narrow sense as has been SY. Concerning the structure of production, it can be pointed out that SY tends to be capital-intensive, SFM to be labor-intensive while EM is knowledge-intensive. This means that for forest owners, production factor endowments in their regional circumstances, such as the labor market or number of well-educated personnel in silviculture, is one of factors determining which concept they accept.

Now forest owners may, along with considering this point, choose three types of strategies. One strategy is seeing advantage in selling their timber which has value-added as a result of attaining eco-certification, which means accepting the SFM scheme in public beyond SY. The second strategy is attaining more financial aid by entering into EM contracts on an ecologically sounder silvicultural operation than SFM with beneficiaries, scientifically supported by forestry institutions and politically authorized by (local) government. Such a strategy has been already adopted, for example the “*Vertragsnaturschutz*” (nature conservation contract) in German-

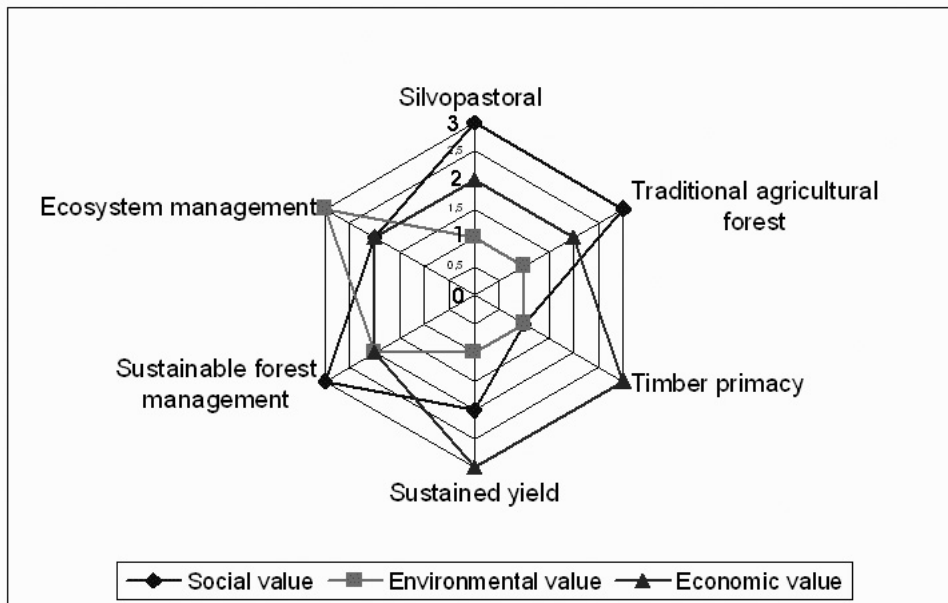


Fig. 3. Values and Forest management approaches

speaking countries (e.g. v.SPERBER, 1992) and the more complex and international system of “Natura2000” in the EU pursuing biodiversity. The third strategy may be aimed at finance by national government through enhancing material circulation to contribute to both global warming mitigation and enhancing job opportunities in rural areas, which keeps SY or wake theory.

Regarding efficiency, the first strategy depends on the price of certified timber. The second strategy depends on the cost performance of the proposed silvicultural operations by the relevant forestry institutions and, therefore, both the role of forestry scholars and continuing research (including monitoring) are important. The third strategy concerns the total eco-efficiency (HOFFRÉN, 1999) of society.

As for equity, at least all strategies should be discussed at the macro-level as well as micro-level. For example, we should ask the question “Who has augmented demand for the ecological function of forests such as biodiversity during the process of economic growth?” That is to say, human society, being part of the ecosystem is a system of interdependent stakeholders and therefore the micro-macro linkage in the socio-economy as well as in the ecosystem should be taken into account.

This typology of forest owners’ strategy in the three categories may be rough, but deserves conceptual and empirical scrutiny.

Finally, we mention Japan’s situation which seems worse than Europe’s. Very low international competitiveness in silvicultural practices on account of topological, ecological and climatic conditions does not easily allow forest owners to follow the previously discussed strategies. Some have already given up management all together. But as petroleum prices rise or bio-energy technology advances more, the third strategy may become more realistic. There are many insufficiently tended planted forests, up to 10 million ha or about 40% of total forests in Japan, and it may be the best way to utilize the low quality timber as biomass resources, although no one can be optimistic. Anyway, it is certain that Japan’s forests and mountain villages have been invisible, forgotten, neglected or even destroyed since the economic growth induced by industrial sector typified by the motor industry in the 1960s and now they are the focus for a social discussion in the context of achieving the possibility of a sustainable society by collaboration at local level. When one discusses it, from time to time, the heavy damage caused by flood and drought remind people of the multifunctionality of *yama* and traditional Japanese proverb again. This is the reason why the local forest environment tax has been accepted in many prefectures. In conclusion, people are well aware of the environmental function of *yama* and are willing to pay a little bit for it at the local level now. But the amount of the tax is not enough to restore the forest quickly and how to manage the forest is still a very difficult problem for foresters, even if forest owners could clearly choose their strategies by publicly declared charter for forest management. Both institutional and technological aids for forest owners would be more and more necessary for choosing their strategies, which, in general, may be common in mountainous regions in Europe.

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Summary

The analysis of the evolution of forest management in the historical periods is an important tool in estimating changes of society's perception of forest resources. This paper describes in brief the historical evolution of forest management in Europe and in Japan and the motivations of these changes. In particular, the paper analyses three periods: pre-industrial (from the Middle-ages until the mid-17th century), industrial (from the mid-17th until the mid-20th century) and the post-industrial period (from the late-20th century until today). For every period it describes the main management systems adopted and the theoretical aspects that have determined their development.

Key words: Forest management, sustainability, multifunctionality, Europe, Japan.

References

- 1) The reason from intense deforestation in the modern age was rapid population growth linked to the end of two important diseases (typhus epidemics and bubonic plague) (LE MASTER & SCHMITHÜSEN, 2006).
- 2) As is often pointed-out, it was historical irony for German forestry that the notion *Dauerwald* was strongly supported and promoted in all over German states by *Nazis* in 1930's (perhaps from 1934 to 1937) based on a rhetoric "eternal forest – eternal Volk", which has brought German forestry set back after a long while (IMORT, 2005). In 1935 Aldo Leopold visited Germany, and the silvicultural practice deeply impressed him. After coming back to the US, with homage to European forestry he wrote, "Some species of trees have been 'read out of the party' by economics-minded foresters because they grow too slowly, or have too low a scale value to pay as timber crops: white cedar, tamarack, cypress, beech, and hemlock are examples. In Europe, where forestry is ecologically more advanced, the non-commercial tree species are recognized as members of the native forest community, to be preserved as such, within reason. Moreover some (like beech) have been found to have a valuable function in building up soil fertility"(LEOPOLD, 1949) Indeed, the doctrine of regarding beech as soil fertilizer even in pine forest in northeast part of Germany was that of Möller. He called beech "Mother of Forest".
- 3) EISENSTEIN, S. (c.1920s) had been inspired by kanji and invented the "*montage*" technique in his movies such as "Strike".
- 4) For example, the highest mountain in Japan, Mt.Fuji, is called *Fuji-san* in Japanese. ("*Fuji-yama*" is not correct at all).
- 5) This chapter follows Mitsui (1997).
- 6) The beginning is uncertain, for it was nonliteral society, but the end is about 3rd century, A.D.
- 7) This reminds us of Marx's view of "Asiatic Mode of Production", developed afterwards by Wittfogel (1957). Weber (1922) also refers to the difference between *Waldrodungskultur* in Europe and *Bewässerungskultur* in China and Egypt.
- 8) See TAKEUCHI *et al.* (2003)
- 9) Holland was exceptionally permitted to have restricted trade with Japan, for the country was Protestant and thought relatively less "dangerous" than Catholic countries. It was narrow but important channel through which European information had been introduced into Japan for almost next three centuries.

- 10) Most famous example is the idea by KUMAZAWA Banzan in Okayama region where overcutting of pine trees for making salt had rapidly proceeded. One of traditional adages has been well-known in Japan: "In order to govern the State, govern its watersheds in advance."
- 11) There was big controversy between the Forestry Agency and Dr Mine, K., Professor of Tokyo University. The 'defeat' of Dr Mine has caused huge deficit of Japan's State Forest up to 35 milliards of Euros until fiscal year 2000 accompanied with worsened forest stock both in quality and quantity. In other words, in Japan's State Forest in the 20th century, even SY (nor TP) doctrine has not been achieved. It may be interesting that in the same period there seemed to be similar controversy in Soviet Russia according to Tanaka (1991) and L.M. Leonov's novel "The Russian Forest" (1953).
- 12) It should be added that size of Japanese private forests is smaller than even that of France, although simple comparison is dangerous. For example, in the year 2000, private forest owners with less than 5ha occupied 73% of the total number of owners, owning only 15% of total area, while these figures neglect forest owners owning less than 1ha, most of whom are farmers, because of lack of statistics.
- 13) This point was not clearly shown by the Forestry Agency when it introduced zoning. As a result, at the regional level of forest administration, private forest owners hesitated to be classified as "coexistent forest" which veritably means recreational forest and seemed in the possible future to be more restrictive zone with insufficient compensation than other the two zones of "resource-rotating forest" and "water-conservation forest" in which generally (modest) timber production is and will be permitted. Zoning policy should aim at clarifying the relationship between the purposes, beneficiaries and finance of forest management. However, the overall Japanese financial situation has not allowed such clarification since introducing zoning system.

- AGNOLETTI, M. (2002) Bosco ceduo e paesaggio: processi generali e fattori locali. In: Ciancio O., Nocentini S. (a cura) "Il bosco ceduo in Italia", Accademia Italiana di Scienze Forestali, Firenze: 21-62.
- AGNOLETTI, M (2006) Man, forestry, and forest landscapes. Trends and perspectives in the evolution of forestry and woodland history research. *Schweiz. Z. Forstwes.* 9: 384-392.
- AKIYAMA, T. (1960) Kokuyu-rin keieishiron (History of National Forest Management in Japan). Nihon-ringyo-chosakai, Tokyo, 410 pp.
- BLOCH, M. (1952-56) Les caractères originaux de l'histoire rurale française. Paris (Italian translation: I caratteri originali della storia rurale francese – Torino 1973).
- CALLICOTT, J.B. (2000) Aldo Leopold and the foundations of ecosystem management. *Journal of Forestry* 5: 5-13.
- DELORT, R. (1972) La vie au Moyen Age. Lausanne (Italian translation: La vita quotidiana nel Medioevo – Roma-Bari 2005).
- DUBY, G. (1962) L'économie rurale et la vie des campagnes dans l'Occident médiéval (France, Angleterre, Empire, IX-XV siècles). Paris (Italian translation L'economia rurale nell'Europa medievale. Francia, Inghilterra, Impero (secoli IX-XV) – Roma-Bari 1988).
- EISENSTEIN, S. (c.1920's) Dialectics of the movie. (Japanese translation from Russian: Eiga-no-bensho-ho, Ourai-sha, Tokyo, 1932: 189 pp.).
- FAO (2001) Global forest resources assessment 2000. Main report. Food and Agriculture Organization of the United Nations, Rome.
- FRITZBÖGER, B.; SØNDERGAARD, P. (1995) A short history of forest uses. In: Hytönen M. (ed.) "Multiple-use forestry in the Nordic countries", METLA, The Finnish Forest Research Institute: 12-41.
- GLÜCK, P. (1987) Social values in forestry. *Ambio* 2-3: 158-160.
- GOLINELLI, P. (1988) Tra realtà e metafora: il bosco nell'immaginario medievale. In: Andreoli B., Montanari M. (ed.) "Il bosco nel medioevo", Bologna: 97-123.
- GRUMBINE, R.E. (1994) What is ecosystem management? *Conservation Biology* 8: 27-39.
- HELLIWELL, D.R. (1987) Multiple-use forestry in the United Kingdom. *Ambio* 2-3: 129-133.
- HIGOUNET, C. (1966) Les forêts de l'Europe occidentale du V^e au XI^e siècle. Paper presented at the XIII Settimana di Studio del Centro Italiano sull'Alto Medioevo on "Agricoltura e mondo rurale in Occidente nell'Alto Medioevo", 22-28 April 1965, Spoleto: 343-397.

- HOFFRÉN, J. (1999) Measuring the Eco-efficiency of the Finnish Economy. Statistics Finland Research Reports 229, 80 pp.
- IMORT, M. (2005) "Eternal Forest – Eternal Volk". The Rhetoric and Reality of National Socialist Forest Policy. In: Brüggemeier, F.-J. *et al.* "How Green Were the Nazis?: Nature, Environment, and Nation in the Third Reich", Ohio University Press, Athens: 43-72.
- KAKIZAWA, H. (1999) Ecosystem Management (in Japanese). Tsukiji-shokan, Tokyo, 206 pp.
- KENNEDY, J.J. (1985) Conceiving forest management as providing for current and future social value. *Forest Ecology and Management* 13: 121-132.
- IGUCHI, S. (1985) On French case which DE RIJKE cited for discussing erosion control works (in Japanese). *DE RIJKE Kenkyu* 1: 9-23.
- KOCH, N.E.; KENNEDY, J.J. (1991) Multiple-use forestry for social values. *Ambio* 7: 330-333.
- LE GOFF, J. (1980) Le désert-forêt dans l'Occident médiéval. In: Traverses, 19, Paris: 22-33 (Italian translation Il meraviglioso e il quotidiano nell'Occidente medievale – Roma-Bari 1983: 25-44).
- LEOPOLD, A. (1949) A sand county almanac. With essays on conservation from Round River. Oxford Univ. Press (reprinted by Ballantine Books, NY): 247-249.
- LUCKERT, M.K.; WILLIAMSON, T. (2005) Should sustained yield be part of sustainable forest management? *Canadian Journal of Forest Research* 2: 356-364.
- MARINELLI, A. (1987) Estimo forestale ed uso multiplo del bosco. XVII incontro di studio "Il bosco e l'ambiente: aspetti economici, giuridici, estimativi" Ce.S.E.T., Firenze: 265-280.
- MCPFE (2000) General Declarations and Resolutions adopted at the Ministerial Conference on the Protection of Forests in Europe – Strasbourg 1990 – Helsinki 1993 – Lisbon 1998. MCPFE, Liaison Unit Vienna, 88 pp.
- MITSUI, S. (1997) Commons and Watersheds with regard to forests (in Japanese). *Kankyo-Shakaigaku-Kenkyu* 3: 35-45.
- MÖLLER, A. (1922) *Der Dauerwaldgedanke*. Springer Verlag, Berlin.
- MONTANARI, M. (2003) La foresta come spazio economico e culturale. Paper presented at the L Settimana di Studio del Centro Italiano sull'Alto Medioevo on "Uomo e spazio nell'Alto Medioevo", 4-8 April 2002, Spoleto: 301-340.
- MORIKAWA, J. (1986) Doitsu-ringaku no juyoukatei (The process of accepting German forest science in Japan). *Sakuyou-ongakudai-gaku/Sakuyou-tankidaigaku-kenkyukiyou* 2: 7-22.
- NASO, I. (1988) Una fonte scritta per la storia forestale nel Medioevo: gli statuti delle comunità piemontesi e la salvaguardia dei boschi. In: Andreoli B., Montanari M. (ed.) "Il bosco nel medioevo", Bologna: 149-158.
- ORTALLI, G. (1997) *Lupi genti culture. Uomo e ambiente nel medioevo*. Einaudi, Torino, 209 pp.
- PANERO, F. (1988) Boschi e foreste nel Piemonte medievale: problemi di documentazione. In: Andreoli B., Montanari M. (ed.) "Il bosco nel medioevo", Bologna: 143-148.
- LE MASTER, D.C.; SCHMITHÜSEN, F. (2006) The continuing evolution in social, economic, and political values relating to forestry in the United States and in Europe. In: "Working toward Common Goals in Sustainable Forest Management: The Divergence and Re-convergence of European and American Forestry", 2006, Pinchot Institute for Conservation, Washington D.C.
- PREGERNIG, M.; WEISS, G. (1998) Forest Policy in Austria: Policy Making by the Sector for the Sector. Paper presented at the European Regional Meeting on "The Underlying Causes of Deforestation and Forest Degradation in Europe", 28-29 October, Bonn.
- ROBERTSON, F.D. (1991) The next 100 years of national forest management. *Transact. N. Am. Wildl. And Natur. Resour. Conf.* 56: 19-21.
- SHIMAMOTO, M. (1988) Sekai no zourin / ikurin-hi (Sylvicultural cost of the various countries in the World), *Ringyo-Keizai (Forest Economy)* 594: 1-10.
- TAKEUCHI, K.; BROWN, R.D.; WASHITANI, I.; TSUNEKAWA, A.; YOKOHARI M.(eds) (2003) *Satoyama : The Traditional Rural Landscape of Japan*. Springer, Tokyo: 229 pp.
- TANAKA, S. (1991) Mori to mizu no shakaikeizaishi (Socio-economic history of Forests and Water). *Nihon-Ringyo-Chosakai*, Tokyo: 242 pp.

- THOMAS, K. (1983) *Man and the Natural World*. Penguin Books, London.
- VEHKAMÄKI, S. (2005) The concept of sustainability in modern times. In: Jalkanen A., Nygren P. (eds.) "Sustainable use of renewable natural resources – from principles to practices", University of Helsinki Department of Forest Ecology Publications 34: 1-13.
- VILLANI, C. (1988) Il bosco del re: consuetudini di caccia negli Annales Regni Francorum. In: Andreoli B., Montanari M. (ed.) "Il bosco nel medioevo", Bologna: 73-81.
- VOS, W. (1996) Changing forest functions in new Europe: from alienation to involvement. In: Glück P. and Weiss G. (eds.) "Forestry in the Context of Rural Development: Future Research Needs", EFI Proceedings 15: 127-139.
- WALKER, J.L. (1990) Traditional Sustained Yield Management: Problems and Alternatives. *The Forestry Chronicle* 2: 20-24.
- WEBER, M. (1922) *Wirtschaft und Gesellschaft*, Erster Teil, II-§24a. Hauptformen der Appropriations- und Marktbeziehungen. www.textlog.de/7373.html (downloaded on 29 Aug 2006).
- WICKHAM, C. (1990) European Forests in the Early Middle Ages: Landscapes and Land Clearance. Paper presented at the XXXVII Settimana di Studio del Centro Italiano sull'Alto Medioevo on "L'ambiente vegetale nell'Alto Medioevo", 30 march-5 april 1989, Spoleto: 479-545.
- WILLIAMS, K.; CARY, J.; WEBB, T. (2001) Social research priorities for forest management. *Tasforests* n. 2: 303-307.
- WITTFOGEL, K.A. (1954) *Oriental despotism: a comparative study of total power*. New Haven : Yale University Press : 556 pp.
- WOLYNSKI, A. (1998) Evoluzione storica della selvicoltura naturalistica. *Sherwood* 40: 5-11.
- YAMAGATA, M. (1994) Doitsugo-no Wald to Forst, Nihongo-no Mori to Hayashi to Shinrin (German Wald and Forst, Japanese mori , hayashi and shinrin). *Shinrinbunkakenkyu* 15: 143-156.
- YORIMITSU, R. (1984) *Nippon no shinrin / midori-shigen* (Japan's forest and "green resources"). Toyo-keizai-shinposha, Tokyo: 208 pp.
- VON SPERBER, H.L. (1992) Kosten des Vertragsnaturschutz im Privatwald. *Forst und Holz* 25: 34-37.

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欧州および日本における森林管理の歴史的展開

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要 旨

森林資源に関する社会思潮の変化を推量するためには、歴史的諸段階における森林管理の展開を分析することが必要である。小論は、欧州と日本における森林管理の歴史的展開、ならびにこうした変化を促した要因を略述した。とりわけ小論において分析したのは、1)工業化以前の時代(中世から17世紀中葉まで)、2)工業化の時代(17世紀中葉から20世紀中葉まで)、3)工業化以降の時代(20世紀後半から今日まで)の3期である。それぞれの時期において採用された主要な経営方式、ならびにそれらの発展を規定する理論的諸相を記述した。

キーワード： 森林管理・持続可能性・多機能性・欧州・日本